

A CENTIGRADE THERMOMETER SCALE PREFERRED.

We take from the report¹ of the annual meeting of the National Academy of Sciences, held in Washington, April 17 to 19, 1916, the following paragraphs of interest to Weather Bureau men.

"A report of the committee [of the National Academy of Sciences] on bill H. R. 528, discontinuing the use of the Fahrenheit thermometer scale in Government publications, was adopted as follows:

Your committee for the consideration of bill H. R. 528, consisting of Messrs. C. G. Abbot, S. W. Stratton, and C. F. Marvin, unanimously reports the following resolution, and moves its adoption:

The National Academy of Sciences shares the desire of scientific men in general for international and world-wide uniformity in units of measurement of all kinds, and with this object in view it favors the introduction of the centigrade scale of temperature, and units of the metric system generally, as standards in the publications of the United States Government.

It must be recognized that considerable initial expense must be incurred by the United States Weather Bureau in changing its apparatus to conform to the proposed act. Furthermore, on account of the more open scale of the centigrade system that bureau will be subject to a continued increased cost of publication, owing to the necessity of printing the first decimal place in order to maintain the present accuracy. The use of negative temperatures and minus signs entails greater liability to errors, and more clerical labor would be required in checking the accuracy of the reports of cooperative observers of the Weather Bureau and in computing monthly and other mean temperatures.

Notwithstanding the foregoing, the academy is in favor of legislation to make the centigrade scale of temperatures the standard in publications of the United States Government, and funds should be made available by Congress to accomplish the desired result.

The academy favors bill H. R. 528, "to discontinue the use of the Fahrenheit thermometer scale in Government publications," but recommends that it be amended by the addition of the following:

"Sec. 4. When in the publication of tables containing several meteorological and climatic elements the use of data in centigrade temperatures leads to manifest incongruities, the Chief of the Weather Bureau is directed to publish related data in such units as are necessary to make the tables homogeneous and to secure international uniformity as far as practicable.

"Sec. 5. Nothing in this act shall prevent the use of the absolute centigrade scale of temperature in publications of the Government."

MARCELLUS HARTLEY MEMORIAL MEDAL, 1916.

[On April 18, 1916, the National Academy of Sciences, meeting at Washington, D. C., awarded a Marcellus Hartley medal "for eminence in the application of science to the public welfare" to Prof. Cleveland Abbe in recognition of his services in connection with the foundation and organization of the United States Weather Bureau. The nominating speech was made by Prof. William Morris Davis, and the acceptance was by Prof. Charles Frederick Marvin for Prof. Abbe, who was absent on account of ill health.

The award of the Hartley medal to Cleveland Abbe is the first time this medal has gone to one of the members of the National Academy of Sciences.

By the courtesy of the National Academy of Sciences it is possible to publish here the remarks made on the occasion, remarks of historic value as indicating the character of the medallist and also as recording some little-known details in the history of the Weather Bureau.—C. A. jr.]

REMARKS BY WILLIAM MORRIS DAVIS.

Among the gratifying duties of the National Academy of Sciences is that of awarding certain medals in recognition of notable achievement. One of our medals, founded by a daughter in memory of her father, Marcellus Hartley, of New York, is to be given for "eminence in the application of science to the public welfare." I am glad, Mr. President, that this medal is awarded for *eminence* in the application of science, for if it were to be awarded for *prominence*, it never could have been given to a man so modest, so retiring, so diffident, as

Cleveland Abbe. We all have had a warm pleasure in voting to approve the discernment of our committee in nominating this gentle man, who has so long labored quietly, without ostentation, never intruding himself upon public notice for the display of his learning, to be the recipient of a medal for real eminence in the work that he has done for his country's good.

It is singular and regrettable that, although we have a large and varied assortment of weather, sometimes, indeed, an oversupply of it, spread across the continent from ocean to ocean, we have had but few weather men—meteorologists—of high standing. The devotees of the subject have too often perpetuated an unscientific, astrological habit of mind, elsewhere extinct. Only about six of them have attained academic rank. Redfield and Espy were contemporaries and competitors in the first half of the nineteenth century—Redfield, a careful observer and a cautious theorizer, a true inductive philosopher, to whom the world owes the first demonstration that West Indian hurricanes are gigantic whirlwinds; Espy, an equally good observer but a bolder theorizer, whose keen deductions regarding atmospheric convection and the associated adiabatic changes of temperature in air currents having a vertical component excited less admiration in our own than unlearned country than in more learned countries abroad. The work of these eminent Americans was done before the formation of the National Academy, but Redfield was a member of the American Academy of Arts and Sciences in Boston, and Espy of the American Philosophical Society in Philadelphia.

Long before their time lived the most famous of all American meteorologists, Benjamin Franklin, who not only established the identity of lightning and electricity about the middle of the eighteenth century, but proved at a somewhat earlier date that our northeast storms come from the southwest, and thus laid the basis of modern weather predictions. His name is still worthily celebrated every year by the famous academic society that he founded.

Redfield and Espy were followed in the second half of their century by Loomis and Ferrel, in whom the contrasts of the two earlier masters were repeated. They were both members of this Academy. Like Redfield, Loomis was faithfully inductive; it was he who first analyzed and generalized the great body of observations that were recorded on the early weather maps of the Signal Service. He thus established a large number of values regarding the behavior of winds, the changes of temperature, and the fall of rain or snow in the traveling areas of high and low pressure that sweep eastward through the Temperate Zone; and in this fundamental work he has not, I regret to say, as yet been followed by a worthy successor. Like Espy, Ferrel was inventively deductive; he directed his extraordinary native powers of mathematical analysis to such problems as the general circulation of the atmosphere and the vortical currents of cyclones and tornadoes, and made an enduring mark upon them. The autobiography of this self-taught farmer's boy is a touching story of emerging genius.

During an intermediate period Maury systematized the reduction of meteorological observations at sea; Joseph Henry did much to encourage systematic meteorological observation on land; and Coffin, utilizing all available records from lands and seas, compiled his great work on the Winds of the Globe; but the impress of these three men on the scientific interpretation of atmospheric phenomena was not so profound as that of Redfield and Espy before them or of Loomis and Ferrel after them.

¹ Proc., Nat'l Acad. Sci., May, 1916, v. 2, No. 5, p. 304.

Cleveland Abbe was for a time the academic contemporary of the last two named, as he is now almost their solitary meteorological successor in this country; for of others, we have lost Lawrence Rotch, founder and director of that admirable institution, the Blue Hill Meteorological Observatory, near Boston, by his untimely death four years ago.

It is the practical turn which Abbe gave to his scientific studies nearly 50 years ago that we celebrate to-night, for it was then, when he was a young man in Cincinnati in 1868, that he first put into execution in this country a scheme of daily weather prediction, based upon the telegraphic concentration of widespread synchronous observations. Would that he could be with us this evening to tell the story of that novel undertaking, but in his absence I may perhaps advert to certain matters which might embarrass him were he with us. His private enterprise was soon superseded by the establishment of a national meteorological bureau at the hands of Gen. A. J. Myer, Chief Signal Officer of the Army; and thereupon Abbe was brought to Washington as the one expert of the country qualified to set the new service on its scientific feet. Here for all these years since 1870, first in the War Department, later in the Department of Agriculture, he has been the senior scientific adviser of the Weather Service, and thus his influence in practical meteorology over the length and breadth of our land has been enormous. Although his hand has taken its turn with others at the exacting duty of daily prediction and has carried on its assigned share of the over-great volume of routine tasks that are conventionally customary in meteorological institutions, his heart has never ceased to turn to or to yearn for the more original efforts of scientific investigation. More characteristic of the man than his work in such necessary matters as the construction of tables for the daily routine of reducing barometric observations to the level of the sea, or the preparation of instructions for reducing the daily routine of meteorological duties to the level of the observer, was his translation of several difficult mathematical memoirs on the circulation of the atmosphere, published and distributed by the Smithsonian Institution, out of which I fancy he had greater enjoyment than anyone else—though that is not saying much. Evidently enough, therefore, the one great practical scheme of daily weather prediction, that has made him deservedly eminent in the application of science to the public welfare, did not divert his mind from unpractical scientific research. He has always willingly turned his attention to new problems and become happily engrossed in them when opportunity offered, yet he has ever been ready to interrupt his work and to draw on his great store of learning to answer questions from inquirers of all degrees. I fear that his scientific spirit has not at all times been happy under the regulations that are presumably appropriate in a large governmental bureau, and that his sensitive nature has sometimes been bruised by the arbitrary discipline of wholesale official service. But his is a buoyant disposition, and cheerfulness has long been his dominant quality.

We all regret his absence this evening. As he can not be with us in the flesh, let us draw him forth in spirit from his self-effacing retirement; let us see in imagination the genuine surprise that he would feel on learning of our action in selecting *him* for a high distinction; let us through our memory of other years enjoy the genial smile with which he would return our greeting. Mr. President, it is a great pleasure most cordially to present *in absentia* Prof. Cleveland Abbe, that he may receive from

you, through the hands of his former pupil, his present superior officer and his constant friend, the Chief of the Weather Bureau,¹ the medal which he so richly deserves.

REMARKS BY PROF. C. F. MARVIN.

Mr. President, members, and guests of the National Academy:

Words fail me to speak fully of my deep feeling on this occasion. I can not tell how much I appreciate this great privilege and honor that devolves upon me in accepting this medal for Prof. Abbe, with whom I have been intimately associated for more than 30 years. During this time we have worked side by side, so to speak, and I have learned not only to hold him in the greatest esteem because of his eminent work in science, but also to love him dearly because of those modest, gentle, and beautiful qualities of character that were just now set out in such touching fashion by Prof. Davis. His whole life and energies have been devoted to the advancement of the science of meteorology; he has thought only of its problems and how he could encourage and induce others to unravel its perplexities, and has never given any thought to himself. These characteristics, it seems to me, add greatly to the eminence Prof. Abbe has attained, the eminence unsought by himself but bountifully bestowed upon him by others. Only a short time ago, when it was learned that he had been awarded this medal and he had requested me to receive it for him, I asked him to tell me what to say for him in acceptance. Without a moment's hesitation he replied: "Oh, they do too much for me, they must not forget Henry, Espy, Ferrel, Lapham, and others."

I am only an humble worker in the domain of science and I could never hope to deserve so great an honor as a medal like this for myself. Therefore this is the greatest event in my life, and I feel deeply the privilege and honor of receiving this medal for Prof. Abbe, whom I love and esteem so highly. Just this morning I received a note from Prof. Abbe giving an account, in his own words, of his early work leading to the creation of the weather forecasting service in the United States.

If you will permit me, Mr. President, I should like to read what Prof. Abbe says. It will take but a few minutes and I believe the members of the Academy will be glad to hear from him.

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A SHORT ACCOUNT OF THE CIRCUMSTANCES ATTENDING THE
INCEPTION OF WEATHER FORECAST WORK
BY THE UNITED STATES.

By CLEVELAND ABBE.

My boyhood life in New York City had impressed me with the popular ignorance and also with the great need of something better than local lore and weather proverbs. The knowledge of the sailors and farmers whom I met seemed to me unsatisfactory. The popular articles in the New York daily papers, by Merriam, Espy, Joseph Henry, and others—notably Redfield and Loomis—had by 1857 convinced me that man should and must overcome our ignorance of the destructive winds and rains. It was in the summer of 1857 or 1858 that I read the beginning of the classic article by William Ferrel in the *Mathematical Monthly*. I realized that he had overcome many of the hidden difficulties of theories of storms and winds; from that day he was my guide and authority. During 1858–1864, in the practice and study of astronomy with Brünnow at Ann Arbor, Mich., and Gould at Cambridge, Mass.,

¹ Charles Frederick Marvin.